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(71)Applicant : BRIDGESTONE CORP

(72)Inventor : OGAWA YUICHIRO

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(54) PNEUMATIC TIRE AND FORMING METHOD THEREFOR

(57)Abstract:

PROBLEM TO BE SOLVED: To strongly retain codes constituting a carcass layer at bead parts with a simple structure.

SOLUTION: Since a carcass layer 16 is constituted by displacing two code assemblies 17 by a distance L in the peripheral direction, a distance P between arches 19 is widened, which makes the placing work of the codes 18 simple. Since the circumferential part 20 of the codes at the region K where the codes overlap each other is made larger in diameter than the code itself because the codes are in contact with each other and are integrated with each other and the codes are pinched by a bead wire reinforcing layer 22 on both the outsides of the codes in the radial direction at the overlapping region K, the codes are strongly retained.
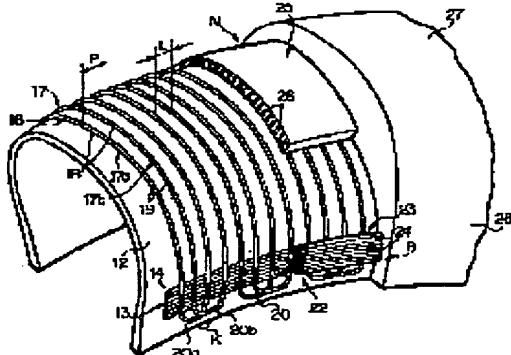
LEGAL STATUS

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CLAIMS

[Claim(s)]
[Claim 1] The arch section of a large number which covered the perimeter and have been arranged
while it consisted of a code prolonged in the direction of the meridian and only the equal distance P
left between the toes of bead of a pair to the circumferencial direction, The periphery section which
consists of a code which connects by turns the inner edges of the arch section which adjoins in both
toes of bead, and is mostly prolonged in a circumferencial direction, since, while constituting the
becoming code assembly from arranging shifting only the distance L which **(ed) said distance P by
n to two or more n layers and circumferencial directions, respectively The carcass layer which
prepared the overlap field by contacting the periphery sections of these code assembly on
parenchyma, Consist of winding bead wires around a multiple-times circumferencial direction, and it
has the bead-wires reinforcement layer which pinches the code assembly near the boundary of said
arch section and periphery section from both sides. The pneumatic tire characterized by mooring the
overlap field of said carcass layer powerfully by the bead-wires reinforcement layer.
[Claim 2] The pneumatic tire according to claim 1 arrange [pneumatic tire] the periphery section in
said overlap field on the top-most vertices of an equilateral triangle, respectively, and it was made to
contact the periphery section of 1 in an overlap field in all other periphery sections on parenchyma
while setting said n to 3.
[Claim 3] Stick on the outside of a base material, making a circumferencial direction carry out
multiple-times winding of the bead wires, and an inside bead-wires reinforcement layer is arranged
to each toe of bead. Next, after forming the toroidal arch section by drawing a code in the direction
of the meridian along the external surface of a base material from one toe of bead to the toe of bead
of another side, A code is mostly led to a circumferencial direction by the toe of bead of another
side, and the periphery section is formed. Next After forming again the toroidal arch section to which
only distance P has separated the code from said arch section to the circumferencial direction by
leading in the direction of the meridian from the toe of bead of another side to one toe of bead, The
activity which leads a code to a circumferencial direction mostly by one toe of bead, and forms the
periphery section again The process which fabricates the code assembly which consists of much the
arch sections and the periphery sections by carrying out repeatedly until the arch section covers the
perimeter and is arranged A carcass layer is constituted by carrying out contacting the periphery
sections on parenchyma, while shifting only the distance L which **(ed) said distance P by n to the
circumferencial direction a total of n times, respectively. By then, the thing stuck on the outside of a
base material, making a circumferencial direction carry out multiple-times winding of the bead wires
The outside bead-wires reinforcement layer which pinches the code assembly near the boundary of
the arch section and the periphery section from both sides with said inside bead-wires reinforcement
layer to each toe of bead is arranged. The shaping approach of the pneumatic tire characterized by
mooring powerfully the overlap field which consisted of that said periphery sections contacted by the
bead-wires reinforcement layer which consists of an outside bead-wires reinforcement layer inside.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the pneumatic tire which has the carcass layer which constituted the code from sticking on the outside of a base material, and its shaping approach.
[0002]
[Description of the Prior Art] As a pneumatic tire which has the carcass layer which constituted the code from sticking on the outside of a base material, conventionally What is indicated by the JP,6-171306,A number official report is known. For example, the carcass layer of this thing The arch section of a large number which covered the perimeter and have been arranged while it consisted of a toroidal code prolonged in the direction of the meridian and only constant pitch C left between the toes of bead of a pair to the circumferencial direction in the tread pin center,large, the periphery section which consists of a code which connects by turns the inner edges of the arch section which adjoins in said both toes of bead, and is mostly prolonged in a circumferencial direction -- since -- it is constituted. And in order to moor the code of such a carcass layer in a toe of bead While twisting a bead code outside two or more times spirally, respectively and forming an outside bead layer in it inside in the shaft orientations of the toe of the arch section, and the periphery section He arranges in these the rubber layer of a high degree of hardness which joins these comrades between an outside bead layer and a carcass layer, and is trying to prevent that the periphery section of a carcass layer falls out and comes out to a radial outside.
[0003]
[Problem(s) to be Solved by the Invention] However, even if it arranges the rubber layer of a high degree of hardness between a carcass layer, and inside and an outside bead layer as mentioned above since any periphery section only consists of thin one code simple substances if it is in such a conventional pneumatic tire, there is a trouble that it cannot fully prevent, about the periphery section falling out and coming out. And since it is narrow, the circumferencial direction distance, i.e., constant pitch C, between the arch sections which constitute a carcass layer, it also has the trouble that the attachment activity of a code will be difficult.
[0004] This invention aims at offering the pneumatic tire which can moor powerfully the code which constitutes a carcass layer in a toe of bead, and its shaping approach, though shaping is easy.
[0005]
[Means for Solving the Problem] The arch section of a large number which covered the perimeter and have been arranged while it consisted of a code prolonged in the direction of the meridian and, as for such a purpose, only the equal distance P left [1st] between the toes of bead of a pair to the circumferencial direction, The periphery section which consists of a code which connects by turns the inner edges of the arch section which adjoins in both toes of bead, and is mostly prolonged in a circumferencial direction, since, while constituting the becoming code assembly from arranging shifting only the distance L which **(ed) said distance P by n to two or more n layers and circumferencial directions, respectively The carcass layer which prepared the overlap field by contacting the periphery sections of these code assembly on parenchyma, Consist of winding bead wires around a multiple-times circumferencial direction, and it has the bead-wires reinforcement layer which pinches the code assembly near the boundary of said arch section and periphery section from both sides. With the pneumatic tire which moored the overlap field of said carcass layer

powerfully by the bead-wires reinforcement layer Stick on the outside of a base material, making a circumferencial direction carry out multiple-times winding of the bead wires, and an inside bead-wires reinforcement layer is arranged [2nd] to each toe of bead. Next, after forming the toroidal arch section by drawing a code in the direction of the meridian along the external surface of a base material from one toe of bead to the toe of bead of another side, A code is mostly led to a circumferencial direction by the toe of bead of another side, and the periphery section is formed. Next After forming again the toroidal arch section to which only distance P has separated the code from said arch section to the circumferencial direction by leading in the direction of the meridian from the toe of bead of another side to one toe of bead, The activity which leads a code to a circumferencial direction mostly by one toe of bead, and forms the periphery section again The process which fabricates the code assembly which consists of much the arch sections and the periphery sections by carrying out repeatedly until the arch section covers the perimeter and is arranged A carcass layer is constituted by carrying out contacting the periphery sections on parenchyma, while shifting only the distance L which **(ed) said distance P by n to the circumferencial direction a total of n times, respectively. By then, the thing stuck on the outside of a base material, making a circumferencial direction carry out multiple-times winding of the bead wires The outside bead-wires reinforcement layer which pinches the code assembly near the boundary of the arch section and the periphery section from both sides with said inside bead-wires reinforcement layer to each toe of bead is arranged. The overlap field which consisted of that said periphery sections contacted can be attained inside by the shaping approach of the pneumatic tire powerfully moored by the bead-wires reinforcement layer which consists of an outside bead-wires reinforcement layer.

[0006] The arch section of a large number which left only the equal distance P to the circumferencial direction in invention according to claim 1, Since the carcass layer is constituted from arranging while only n layers and distance L shift the code assembly which consists of the periphery section which connects the inner edges of the adjoining arch section by turns, it will be n times constant pitch C (said -- shifting -- distance L and the equal distance) in the conventional technique, and becomes quite large, consequently the attachment activity of a code becomes easy, and the distance P between the arch sections which constitute each code assembly can fabricate a carcass layer easily. Moreover, although, as for this carcass layer, the periphery sections have the overlap field which touches on parenchyma as mentioned above Since the periphery section in such an overlap field is mutually restrained by contact and is unified, Since the bead-wires reinforcement layer which pinches a code assembly from both sides near the boundary of the periphery section and the arch section which serve as a major diameter from the code simple substance as a whole, and are moreover located in a radial outside from such an overlap field was prepared It is prevented certainly that said overlap field is powerfully moored by these bead-wires reinforcement layer, and escapes from and comes out of a toe of bead by it. And the carcass layer of such a pneumatic tire can be fabricated by the approach according to claim 3.

[0007] Moreover, constraint of the periphery sections in an overlap field if constituted like according to claim 2 becomes powerful, unification of the periphery section becomes certain, and the ejection from a toe of bead is prevented powerfully.

[0008]
[Embodiment of the Invention] Hereafter, the 1st operation gestalt of this invention is explained based on a drawing. In drawing 1 , N is the raw tire fabricated using the base material (inner mold) which is not illustrated, and this raw tire N has the inside rubber layers 12, such as an inner liner stuck on the outside of said base material, and it constitutes this inside rubber layer 12 from twisting band-like rubber around the perimeter of this base material two or more layers, rotating said base material to the circumference of a medial axis. The inside bead-wires reinforcement layer 13 is arranged on the outside of the inside rubber layer 12 located in each toe-of-bead B, and this inside bead-wires reinforcement layer 13 consists of said base material and here by winding around a circumferencial direction the bead wires 14 which consist of single track steel by which rubber coating was carried out to the outside of the inside rubber layer 12 at a multiple-times curled form. Here, what carried out 1-3 train arrangement of the bead wires 14 as an inside bead-wires reinforcement layer 13 at shaft orientations, and has been arranged 5-10 steps to radial is used.

[0009] 16 is a cross-section toroidal carcass layer arranged in said inside rubber layer 12 and the inside bead-wires reinforcement layer 13 so that an outside may be surrounded, and this carcass layer 16 consists of code assemblies 17 of n layers (n is two or more positive integer values, and is 2 at this operation gestalt) in drawing 1 , and 2, 3 and 4. Each code assembly 17 has the arch section 19 of a large number which consist between the toes of bead B of a pair of a toroidal code 18 prolonged in the direction of the meridian, the perimeter of the raw tire N is covered and these arch sections 19 are arranged while they leave only the equal distance P on a tread pin center,large at a circumferencial direction. Here, although said code 18 is constituted from performing rubber coating to the outside of the cable which twisted the filament, or a monofilament (single track), this rubber coating may be omitted if needed. In addition, only the cable of a code 18 and a monofilament are illustrated in a drawing, and illustration of coating rubber is omitted.

[0010] 20 is the circumferencial direction and the periphery section of a large number (the number and the same number of the arch section 19) which carried out the shape of a half-ellipse mostly here which have been arranged at toe-of-bead B mostly, and these periphery sections 20 consist of codes 18 mentioned above. And these peripheries section 20 has connected by turns the edges within radial of the arch section 19 which adjoins in both toes-of-bead B. That is, when the edges within radial of the two arch sections 19 which adjoin in one toe-of-bead B are connected alternately, the edges within radial of the two adjoining arch sections 19 which shifted to one hoop direction in toe-of-bead B of another side are connected alternately.

[0011] And after the above code assemblies' 17 drawing one code 18 in the direction of the meridian along the external surface of a base material from one toe-of-bead B to toe-of-bead [of another side] B and forming the one toroidal arch section 19, The one periphery section 20 which follows the inner edge of the predetermined distance ****** arch section 19 mostly in this code 18 at a circumferencial direction is formed by toe-of-bead B of another side. Next, a code 18 is drawn in the direction of the meridian like the above-mentioned from toe-of-bead [of another side] B to one toe-of-bead B. While following said periphery section 20, after forming again the toroidal arch section 19 which only distance P has separated from the above-mentioned arch section 19 to the circumferencial direction on the tread pin center,large, It fabricates by doing repeatedly the activity which forms again the periphery section 20 which follows the inner edge of the arch section 19 of the 2nd predetermined distance ****** mostly in a code 18 at a circumferencial direction by one toe-of-bead B until the arch section 19 covers the perimeter of the raw tire N and is arranged. Here, the boundary of the arch section 19 and the periphery section 20 is located near the inside bead-wires reinforcement layer 13 in the case of attachment of said code 18. By this, the inside bead-wires reinforcement layer 13 will be arranged near the boundary of the arch section 19 and the periphery section 20 by the shaft-orientations inside of each code assembly 17.

[0012] And he is trying to constitute the carcass layer 16 from performing the forming cycle of the code assembly 17 which was mentioned above to a total of n times (here 2 times) and a circumferencial direction, while only the distance L which **(ed) by n shifts said distance P at every shaping of the code assembly 17, consequently, as for the code assembly 17 of these n layers (two-layer), only said distance L will be arranged in the condition of having shifted one after another at a circumferencial direction. Thus, if the carcass layer 16 is constituted from arranging while only the n layer (two-layer) distance L shifts the code assembly 17 which becomes a circumferencial direction from the arch section 19 of a large number which left only the equal distance P, and the periphery section 20 which connects the inner edges of the adjoining arch section 19 by turns n times (twice) of constant pitch C [in / in the distance P between the arch sections 19 which constitute each code assembly 17 / the conventional technique] (said -- shifting -- distance L and the equal distance) -- it becomes, and becomes large, consequently the attachment activity of a code 18 becomes easy, and the carcass layer 16 can be fabricated easily. Here, the attachment activity of the above codes 18 is a circumferencial direction to the perimeter of a base material about the code attachment machine which is not illustrated. If it detaches by a unit of 120 degrees, two sets are installed and it is made to stick a code 18 with these code attachment machine on coincidence by two places, the carcass layer 16 can be fabricated only by carrying out 1 rotation (360 degrees) rotation of the base material simply and quickly.

[0013] Moreover, if the code assembly 17 of n layers (two-layer) is arranged as mentioned above

after only distance L has shifted Although the part overlaps shaft orientations, the center section of code assembly 17a of the 1st layer and the center sections [of periphery section 20a] of code assembly 17b of the 2nd layer of periphery section 20b overlap the overlap field K here and the periphery section 20 of these code assembly 17 forms the overlap field K In these overlap fields K, two codes 18 touch shaft orientations on parenchyma with overlap (in the condition of having been arranged on a straight line almost parallel to the inner circumference of toe-of-bead B). Thus, if periphery section 20 comrades establish the overlap field K which touches on parenchyma in the carcass layer 16, in order to restrain the periphery section 20 in this overlap field K mutually by contact, it will unify and it will serve as a major diameter from code 18 simple substance.

[0014] 23 is the outside bead-wires reinforcement layer prepared in each toe-of-bead B of the raw tire N, and these outside bead-wires reinforcement layers 23 are arranged near the boundary of the arch section 19 and the periphery section 20 on the shaft-orientations outside of each code assembly 17. And although the inside and the outside bead-wires reinforcement layers 13 and 23 which were mentioned above constitute the bead-wires reinforcement layer 22 which pinches the code assembly 17 near the boundary of the arch section 19 and the periphery section 20 from both sides as a whole Since each bead-wires reinforcement layer 22 is formed near the boundary of the periphery section 20 of a radial outside, and the arch section 19 from the overlap field K of a major diameter established in the periphery section 20 as mentioned above, This overlap field K is powerfully moored to toe-of-bead B, and it prevents certainly that the periphery section 20 tends to fall out and come out to a radial outside. In addition, specifically in this operation gestalt, the arrangement location of said inside and the outside bead-wires reinforcement layers 13 and 23 is a location where the edge within radial [that] serves as a radial outside from the core (it is the midpoint of both the bead wires 18 when this overlap field K consists of overlaps of two bead wires 18) of the overlap field K. Here, each outside bead-wires reinforcement layer 23 constitutes the bead wires 24 which consist of single track steel by which rubber coating was carried out to the outside of the code assembly 17 from winding around a circumferencial direction at a multiple-times curled form a base material and here. moreover, the thing which this outside bead-wires reinforcement layer 23 carried out 1-3 train arrangement of the bead wires 24 at shaft orientations, and has been arranged 5-10 steps to radial -- using it -- the inside bead-wires reinforcement layer 13 -- one train - twisting mostly two trains is desirable.

[0015] 25 is a belt layer arranged on the radial outside of said carcass layer 16, and this belt layer 25 constitutes the band-like rubber which formed several parallel codes 26 by carrying out rubber coating from twisting two or more layers around the outside of the carcass layer 16 spirally. In addition, although you may constitute from sticking this belt layer 25 one after another in the condition of having made the above band-like rubber inclining to a tread pin center,large, and using more than one as a layer, let the inclination direction be hard flow in two-layer at least in this case. It is the top tread rubber by which 27 has been arranged on the radial outside of said belt layer 25, and side tread rubber by which 28 has been arranged on shaft-orientations both the outsides of the carcass layer 16, and these tops and side tread rubber 27 and 28 constitute band-like rubber from a spiral and twisting two or more layers spirally on the outside of the belt layer 25 and the carcass layer 16. Thus, if the raw tire N is fabricated, as it is, into vulcanization mold (dies body), carrying-in receipt will be carried out, and the base material with which it is equipped with this raw tire N will be vulcanized, and let it be a pneumatic tire.

[0016] Drawing 5 , and 6, 7 and 8 are drawings showing the 2nd operation gestalt of this invention. In this operation gestalt, the carcass layer 16 which consisted of code assemblies 17 of three layers by carrying out while only said distance L shifts the forming cycle of the code assembly 17 mentioned above a total of 3 times at a circumferencial direction at every shaping of the code assembly 17 is fabricated. Consequently, the 1st, code assembly 17a of the 2nd layer, periphery section 20a of b, The center sections of b overlap and it suits in the 1st pile. A field K1 Moreover, the 1st, the 2nd, code assembly 17a of the 3rd layer, Although the center sections of periphery section 20a of b and c, and b and c overlap, suit in the 2nd pile, the 2nd, code assembly 17b of the 3rd layer, periphery section 20b of c, and the center sections of c overlap a field K2 further, it suits in the 3rd pile and a field K3 is formed It suits in said 1st [the] and the 3rd pile, and in fields K1 and K3, like said drawing 3 , as two codes 18 suit in the 2nd pile and a field K2 is shown in drawing 7 ,

three codes 18 touch shaft orientations on parenchyma with overlap. It suits in said 2nd pile and sets to a field K2 here. Periphery section 20a, and b and c It is arranged at the top-most vertices of an equilateral triangle where the base (one side located in the radial inside) was drawn on the meridian cross section almost parallel to the inner circumference of toe-of-bead B, respectively. consequently, the periphery section of 1 contacts all other periphery sections on parenchyma (if for example, periphery section 20a is made into the periphery section of 1 -- this periphery section 20a -- all other periphery sections 20 -- b and c). By this, it suits in the 2nd pile, constraint of periphery section 20a, b, and c becomes powerful in a field K2, unification of these peripheries section 20a, and b and c becomes certain, and escaping from and coming out of toe-of-bead B is prevented powerfully. Moreover, in this operation gestalt, specifically, said inside and the outside bead-wires reinforcement layers 13 and 23 are arranged so that the edge within radial [that] may serve as a radial outside from the core (middle point of said equilateral triangle) of the overlap field K2. In addition, other configurations and an operation are the same as that of said 1st operation gestalt.

[0017] Drawing 9 and 10 are drawings showing the 3rd and 4th operation gestalt of this invention. Although these operation gestalten constitute the carcass layer from the two-layer code assembly 17 like said 1st operation gestalt In the 3rd operation gestalt, the two periphery sections 20 in the overlap field K Are carrying out sequential arrangement on the straight line which inclines so that the inner circumference of toe-of-bead B may be approached as it goes to a bead heal, and it sets in the 4th operation gestalt further. Sequential arrangement of the two periphery sections 20 in the overlap field K is carried out on the straight line which inclines so that it may be isolated from the inner circumference of toe-of-bead B as it goes to a bead heal.

[0018] Drawing 11 , and 12 and 13 are drawings showing the 5th, 6th, and 7th operation gestalt of this invention, respectively. Although each of these operation gestalten constitutes the carcass layer from a code assembly 17 of three layers like the above-mentioned 2nd operation gestalt Periphery section 20a [in / in the 5th operation gestalt, it suits in the 2nd pile, and / a field K2], The surface (one side located in a radial outside) arranges b and c, respectively on the top-most vertices of an equilateral triangle almost parallel to the inner circumference of toe-of-bead B, and they are set in the 6th operation gestalt. Suited in the 2nd pile and periphery section 20a in a field K2, and b and c are arranged, respectively on the top-most vertices of an equilateral triangle where left part (one side close to a bead toe) is mostly prolonged in radial. Furthermore, in the 7th operation gestalt, it suited in the 2nd pile and periphery section 20a in a field K2, and b and c are arranged, respectively on the top-most vertices of an equilateral triangle where the right-hand side (one side close to a bead heal) is mostly prolonged in radial. In addition, as long as said periphery section 20a, and b and c can be fabricated, you may make it arrange them on which top-most vertices of an equilateral triangle.

[0019] Drawing 14 , and 15 and 16 are drawings showing the 8th, 9th, and 10th operation gestalt of this invention, respectively. Although the carcass layer is constituted from a code assembly 17 of three layers like [these operation gestalten] the above-mentioned 2nd operation gestalt In the 8th operation gestalt, suit in the 2nd pile, and are carrying out sequential arrangement of periphery section 20a in a field K2, and b and c on the straight line almost parallel to the inner circumference of toe-of-bead B, and it sets in the 9th operation gestalt. Suit in the 2nd pile and sequential arrangement of periphery section 20a in a field K2, and b and c is carried out on the straight line which inclines so that the inner circumference of toe-of-bead B may be approached as it goes to a bead heal. Furthermore, in the 10th operation gestalt, it suits in the 2nd pile, and sequential arrangement of periphery section 20a in a field K2, and b and c is carried out on the straight line which inclines so that it may be isolated from the inner circumference of toe-of-bead B as it goes to a bead heal.

[0020] In addition, although the carcass layer 16 was constituted for the code assembly 17 from two-layer or arranging three layers, you may make it constitute a carcass layer from arranging four or more layers of code assemblies in the above-mentioned operation gestalt.

[0021]
[Effect of the Invention] As explained above, while shaping becomes easy according to this invention, the code which constitutes a carcass layer can be powerfully moored in a toe of bead.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] a part of raw tire which shows the 1st operation gestalt of this invention -- it is a fracture perspective view.
[Drawing 2] It is the expansion top view of a code assembly.
[Drawing 3] It is a meridian sectional view in the toe of bead of a pneumatic tire.
[Drawing 4] It is the I-I view Fig. of drawing 3 .
[Drawing 5] a part of raw tire which shows the 2nd operation gestalt of this invention -- it is a fracture perspective view.
[Drawing 6] It is the expansion top view of a code assembly.
[Drawing 7] It is a meridian sectional view in the toe of bead of a pneumatic tire.
[Drawing 8] It is the II-II view Fig. of drawing 7 .
[Drawing 9] It is the meridian sectional view of the periphery section in the overlap field which shows the 3rd operation gestalt of this invention.
[Drawing 10] It is the meridian sectional view of the periphery section in the overlap field which shows the 4th operation gestalt of this invention.
[Drawing 11] It is the meridian sectional view of the periphery section in the overlap field which shows the 5th operation gestalt of this invention.
[Drawing 12] It is the meridian sectional view of the periphery section in the overlap field which shows the 6th operation gestalt of this invention.
[Drawing 13] It is the meridian sectional view of the periphery section in the overlap field which shows the 7th operation gestalt of this invention.
[Drawing 14] It is the meridian sectional view of the periphery section in the overlap field which shows the 8th operation gestalt of this invention.
[Drawing 15] It is the meridian sectional view of the periphery section in the overlap field which shows the 9th operation gestalt of this invention.
[Drawing 16] It is the meridian sectional view of the periphery section in the overlap field which shows the 10th operation gestalt of this invention.
[Description of Notations]
14 24 -- Bead wires 16 -- Carcass layer
17 -- Code assembly 18 -- Code
19 -- Arch section 20 -- Periphery section
22 -- Bead-wires reinforcement layer B -- Toe of bead
P -- Distance K -- Overlap field
L -- Distance

[Translation done.]

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DRAWINGS

[Drawing 1]

14, 24 : ビードワイヤ
16 : カーカス層
17 : コード組立体
18 : コード
19 : アーチ部
20 : 円周部
22 : ビードワイヤ補強層
B : ビード部
P : 距離
K : 重なり合い領域
L : 距離
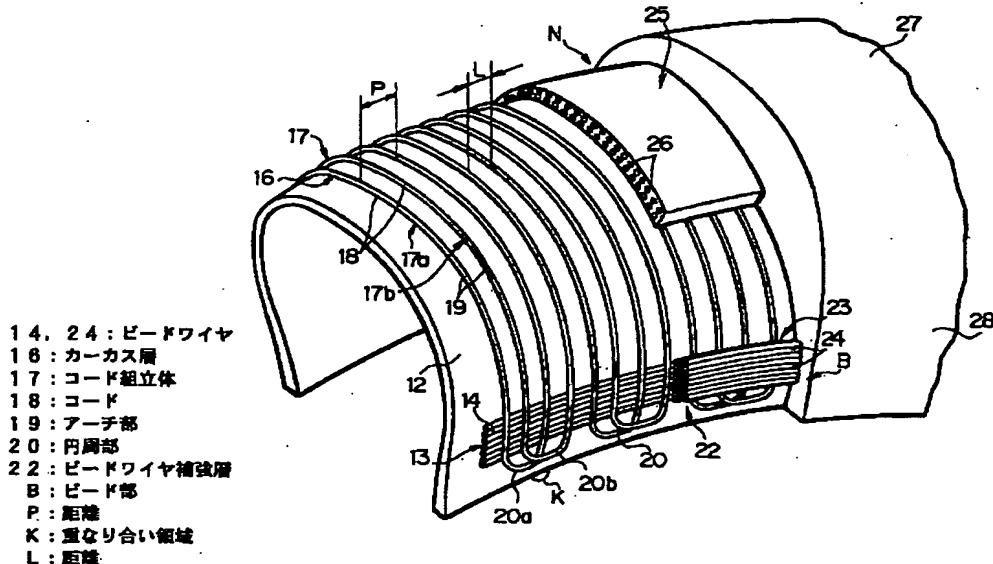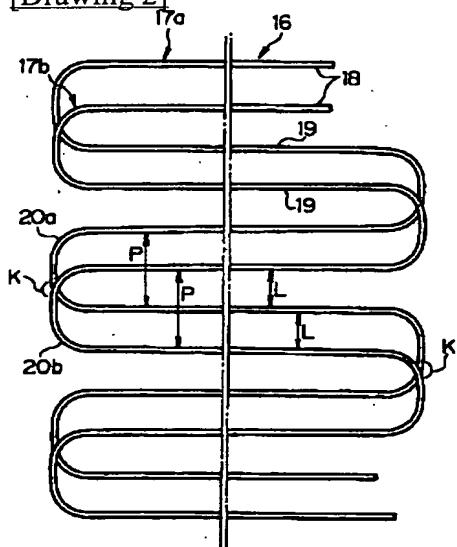
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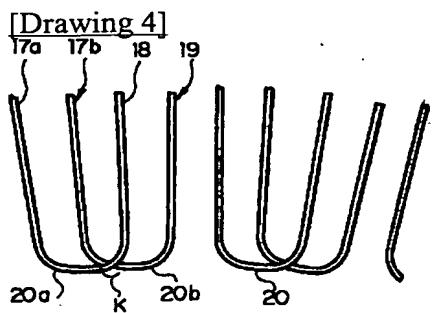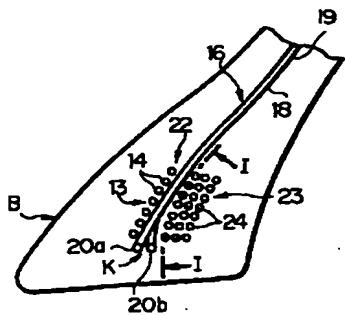
[Drawing 3]

[Drawing 4]
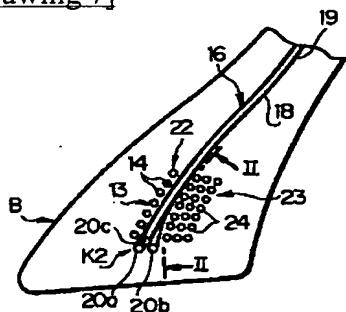
[Drawing 7]

[Drawing 10]
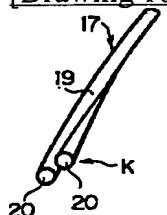
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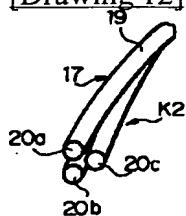
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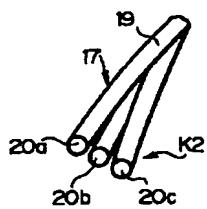
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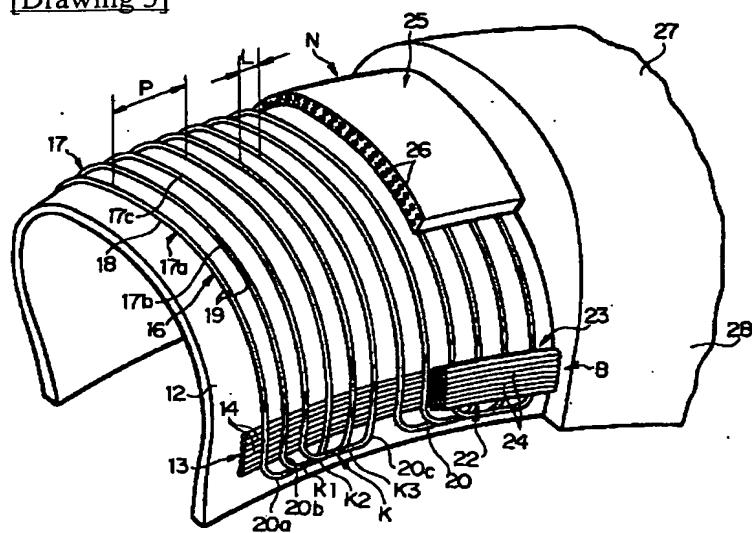
[Drawing 6]
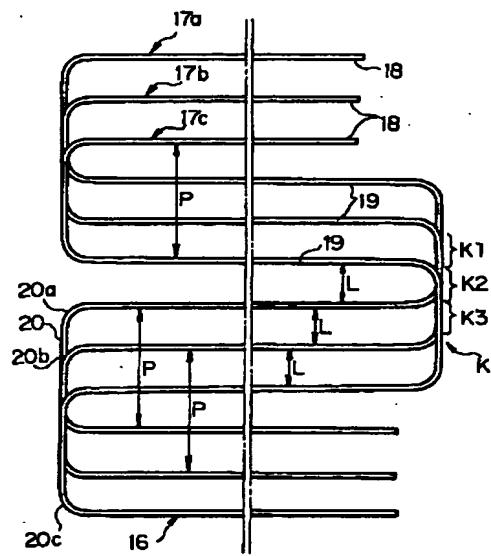
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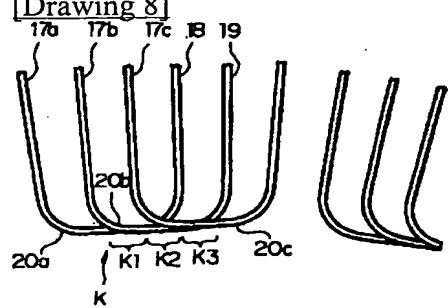
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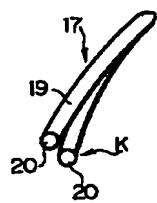
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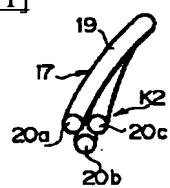
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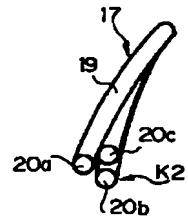
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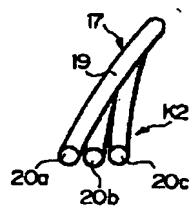
[Drawing 16]

[Translation done.]